CLAIMS:

1. A device for measuring the elasticity of a human or animal organ, in particular of a breast, or more generally all viscoelastic environments presenting an ultrasonic signal after ultrasonic illumination and the consecutive establishing of a representation in two or three dimensions of the elasticity, comprising at least one ultrasonic bar (1) comprising a plurality of transducers (12) or the like, an excitation means suitable for generating and delivering a low-frequency, direct or indirect applied force, a means for acquiring ultrasonic signals, a means for commanding and processing data such as a computer, characterized in that it comprises a scanning means suitable for carrying out a scanning with the above-mentioned bar (1) in one dimension (1D) or in two dimensions (2D) in two perpendicular directions, respectively obtaining in this manner a representation of the measure of the elasticity in two (2D) or three dimensions (3D).

2. The device according to Claim 1, characterized in that the excitation means consists of a mechanical vibration that can be transversal, longitudinal or more generally a mixture of both.

3. The device according to Claim 1, characterized in that the excitation means consists of a remote palpation using the pressure of radiation either with the transducer(s) (12) used for the acquiring ultrasonic signals or several transducers arranged around the viscoelastic environment.

4. The device according to Claim 1, characterized in that the excitation means consist of internal movements of the human or animal body such as, e.g., the beating of the heart.

5. The device according to Claim 1, characterized in that the excitation means consist of one or several hyperthermal transducers, either with the transducer(s) used for acquiring ultrasonic signals or one or several transducers arranged around the viscoelastic environment.

6. The device according to Claim 1, characterized in that the ultrasonic bar is a 1.5 D bar (9) or a wye transducer (12) allowing a focusing at a plurality of different points of elevation and that in this instance the scanning is realized by ultrasonic focalization.

7. The device according to Claim 1, characterized in that the space between the ultrasonic bar (1) and the above-mentioned viscoelastic environment is constituted at least in part by water or any other element capable of assuring the free passage of ultrasonic waves.

8. The device according to Claim 2, characterized in that the mechanical vibration is obtained or realized by one or several vibrating plates(20), piston(s) and/or bar(s).

9. The device according to Claim 1, characterized in that the acquisition means comprises ultrasonic transmitters and receivers, digital-to-analog (CNA) and analog-to digital (CAN) converters, memories and digital and analog transmission lines.

10. The device according to Claim 9, characterized in that the ultrasonic transmitters and receivers are arranged in the proximity of this ultrasonic bar, that is, typically at a distance less than 50 centimeters.

11. The device according to Claim 9, characterized in that the digital-to-analog converters (CNA)and the analog-to-digital converters (CAN) are situated in the proximity of the ultrasonic bar, that is, at a distance less than 50 centimeters.

12. The device according to Claim 11, characterized in that the unit constituted by the ultrasonic transducers and their on-board electronic components is connected to the command means and processing means by a very high-speed digital connection, e.g., of the LVDS type.

13. The device according to Claim 1, characterized in that it comprises two ultrasonic bars (5, 6).

14. The device according to Claim 1, characterized in that it comprises three bars (16, 17, 18) suitable for measuring the tissular speeds along directions y, x and z.

15. The device according to Claim 13, characterized in that the two bars (23, 24) are immersed in a hermetic container (26) filled with a liquid, e.g., water.

16. The device according to Claim 15, characterized in that the hermetic container (26) is connected to a rotation means suitable for rotating this container (26).

17. The device according to Claim 15, characterized in that the hermetic container (26) comprises a plurality of orifices into which a mechanical vibrator (25) and/or an ultrasonic transducer is/are introduced.

18. The device according to Claim 18, characterized in that the orifices on or in the hermetic box (26) are situated at 90° (degrees) from each other or the one from the other.

19. A process for measuring the elasticity of a human or animal organ, in particular of a breast, or more generally all viscoelastic environments presenting an ultrasonic signal after ultrasonic illumination and the consecutive establishing of a representation in two or three dimensions of the elasticity, comprising at least one ultrasonic bar (1) or the like, an excitation means suitable for generating low-frequency displacements, a means for acquiring ultrasonic signals, a means for commanding and processing data such as a computer, a scanning means suitable for carrying out a scanning with the above-mentioned bar (1) in one dimension (1D) or in two dimensions (2D) and obtaining in this manner a representation of the measure of the elasticity in two (2D) or three dimensions (3D), characterized in that it comprises the following steps:

- Generation of a low-frequency applied force or signal and the acquisition of ultrasonic signals,

- Displacements of the bar due to the scanning means in two perpendicular directions,

- Calculation of the ultrasonic images,

- Calculations of the tissular speeds,

- Inversion of the data consisting in recovering the parameters describing this viscoelastic environment.

20. The process according to Claim 19, characterized in that the low-frequency applied force or signal has a frequency between 5 Hz and 1000 Hz.

21. The process according to Claim 19, characterized in that it also comprises a stage of the calculation of the tissular deformation speeds.

22. The process according to Claim 19, characterized in that the second derivatives of the longitudinal component of this speed along the three orthogonal directions in space are measured during the course of the stage of calculating the tissular speeds.

23. The process according to Claim 19, characterized in that the spatial derivatives of the three components of this speed along the three directions in space are measured during the course of the stage of calculating the tissular speeds.

24. The process according to Claim 19, characterized in that the acquisition of the ultrasonic signals takes place while emitting an impulse with the ultrasonic transducers (12) that is reflected by the particles contained in the viscoelastic environment.

25. The process according to Claims 19 and 24, characterized in that the acquisition of ultrasonic signals is realized at a cadence of 1/T typically comprised between 100 Hz and 100,000 Hz, and that T is the period between two ultrasonic emissions.

26. The process according to Claim 19, characterized in that the displacement of the bar is realized by a mechanical scanning or by an ultrasonic scanning in elevation, in particular in the instance when a 1.5 D or 1.75 D bar is used.